

CONGENITAL HEART DISEASE (TCTAP A-051 TO TCTAP A-055)

TCTAP A-051

Changes in Cardiac Form and Function Before and After Transcatheter Closure of Secundum Atrial Septal Defects

Ramesh Gadepalli,¹ Nagamurali Kosuri¹

¹Nizam's Institute of Medical Sciences, India

BACKGROUND Inpatients with congenital heart disease, right ventricular (RV) function is an important prognostic factor but the assessment of RV function remains difficult, mainly because of the complex geometry and the thin myocardial wall. Myocardial performance index (MPI) is a measure of combined Ventricular systolic and diastolic function. In congenital heart disease parameters of contractile function are influenced by different loading conditions. In contrast to myocardial velocities, deformation parameters SR (strain rate) and ϵ are less influenced by global cardiac motion and by tethering of myocardial segments. Longitudinal systolic ϵ and SR have been validated as reliable techniques for the evaluation of RV function under various loading conditions.

OBJECTIVES To study the effect of transcatheter closure of atrial septal defect (ASD) on right ventricular (RV) and left ventricular (LV) function, as well as left atrial (LA) volumes and the influence of pre-load alterations on systolic right ventricular (RV) velocities and deformation indices in patients with atrial septal defect (ASD).

METHODS During a 12 month period from July 2013 through June 2014, 50 patients scheduled for percutaneous closure of an ASD were prospectively enrolled in the study. Pre and post-ASD device closure at 1 week echocardiograms of 50 consecutive patients were done. Measurements of RV and LV MPI and LA volumes were taken. Longitudinal peak systolic velocities, peak systolic strain rate (SR), and end systolic strain (ϵ) were calculated in the mid-segment of the RV free wall and the septum.

RESULTS 50 patients with an average age of 32.5 ± 16.3 years underwent transcatheter closure of ASD. There was statistically significant improvement in RV MPI (0.33 to 0.29, $p = 0.003$), LV MPI (0.35 to 0.30, $p = 0.03$), and LA volume index (27.1 to 22.3 ml/m², $p = 0.001$) after closure of ASD. After ASD closure Indexed measurements of RV long-axis dimension was significantly reduced (69.8 ± 18.6 to 67.3 ± 3.3 , $p = 0.0005$) and of RV inlet (45.9 ± 15.3 to 42.5 ± 13.5 , NS), tricuspid valve annulus (29.9 ± 8.3 to 27.9 ± 8.1 , NS) and RV short axis (30.1 ± 6.9 to 28.2 ± 8.3 , NS) are insignificantly decreased. Peak systolic velocities recorded from the RV free wall returned to normal physiologic values which are initially higher (9.9 ± 2.3 to 7.4 ± 3.8 , $p < 0.001$) And at the interventricular septum, they tended to be higher in patients with ASD compared with control subjects showed a significant decline to subnormal values (4.1 ± 1.2 to 3.2 ± 1.3 , $p = 0.002$) after closure of the defect. Peak systolic SR (RV mid: -3.6 ± 1.0 to -3.4 ± 1.7 and septal: -2.1 ± 0.6 to -1.7 ± 0.6) and end systolic ϵ (RV mid: -48.3 ± 14.2 to -45.13 ± 11.6 and septal: -31.2 ± 14.1 to -27.3 ± 8.3) which are slightly higher compared with normal physiological values, showed a diminishing tendency after closure of ASD, however, the difference was not significant.

CONCLUSION In congenital ASD RV adaptation to a longstanding volume overload causes slightly increased systolic longitudinal deformation suggests an adequate structural and physiologic adaptation of the RV to chronic volume overload. After relief of volume overload, RV longitudinal systolic deformation indices tended to decrease, but not significantly, in contrast, peak systolic velocities decreased significantly suggesting that myocardial velocities are clearly load dependent whereas deformation indices are relatively pre-load stable measures of ventricular contractility.

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Experiences of Combined Treatments of Selective Pulmonary Vasodilators After the Transcatheter Closure in Atrial Septal Defect with Pulmonary Arterial Hypertension

Lucy Youngmin Eun,¹ Kee Soo Ha,² Jo Won Jung,¹ Jae Young Choi¹

¹Yonsei University Severance Hospital, Korea (Republic of); ²Korea University Anam Hospital, Korea (Republic of)

BACKGROUND The clinical course of patient with transcatheter closure of atrial septal defect (ASD) with pulmonary arterial hypertension (PAH) has not been completely understood. Variable pattern of the disease progression and the severity of disease in similar

underlying defects may be the important factors to predict the clinical outcome.

METHODS From May 2006 to June 2012, 457 patients underwent transcatheter closure of ASD. Among them, 68 patients had PAH at the time of procedure. PAH was classified as mild (40-49mmHg), moderate (50-59mmHg), severe (above 60mmHg) according to pulmonary artery systolic pressure (PASP). We reviewed the course of the PAH and complications in these subjects.

RESULTS In mild PAH group ($n=37$), thirty two patients had normalization after the transcatheter closure of ASD, and the remained patients had normalization within 1 month. In moderate PAH group ($n=17$), thirteen patients showed normal PA pressure after closure of ASD, and 4 patients normalized within during follow-up. In severe PAH group ($n=14$), there was no patient who showed immediate normalization after transcatheter closure. During follow-up period, normal PA pressure was shown in 12 patients who had remaining PAH after the procedure. No significant complications related to ASD occlusion and PAH were demonstrated.

CONCLUSION Patients with Atrial septal defect with pulmonary hypertension have more complex clinical and pathophysiologic characteristics. Therefore, treatment strategy in congenital heart disease patients with pulmonary hypertension should be tailored to individual details of disease as well as general measures targeting the pulmonary arterial hypertension.

TCTAP A-053

Clinical Usefulness of Computed Tomography in the Details of Atrial Septal Defect Before Transcatheter Closure

Tsutomu Murakami,¹ Sho Torii,¹ Gaku Nakazawa,¹ Yuji Ikari¹

¹Tokai University Hospital, Japan

BACKGROUND Transcatheter atrial septal defect occlusion (ASO) in adult patients has been increasing. Pre-procedural survey for the feasibility based on the defect diameter and each rim is determined mainly by transesophageal echocardiography (TEE). However, the role of computed tomography (CT) was not fully understood in pre-ASO procedure.

METHODS We assessed consecutive 11 patients (2 male and 9 female) with ASD by CT and TEE. The size of atrial septal defect was compared between CT and TEE. In addition, we evaluated rim defect, abnormalities of pulmonary venous return, and coronary artery stenosis.

RESULTS Mean age was 64.4 ± 6.2 . The size of largest defect was similarly measure between CT and TEE (CT: 17.9 ± 4.4 mm vs. TEE: 17.2 ± 3.3 mm; $r=0.84$, $p<0.01$). There were positive correlations between CT and TEE for measurement of aortic rim ($r=0.85$, $p<0.01$) and superior rim ($r=0.79$, $p<0.01$). CT examination detected 2 patients who were not feasible for ASO due to a broad lack of aortic to superior rim and partial anomalous pulmonary venous connection type. Coronary artery disease was evaluable in all cases.

CONCLUSION CT may be useful for pre-ASO-procedural assessment consisted of the size of atrial septal defect, rim defect and abnormalities of pulmonary venous return in adult patients.

TCTAP A-054

VSD Transcatheter Closure Is an Accepted Mode of Treatment in Selected Cases of Congenital Heart Disease. Lately, This Technology Has Been Applied to Closure of Ventricular Septal Defect (VSD)

Manoj Bhavrilal Chopda¹

¹Magnum Heart Institute, India

BACKGROUND Transcatheter closure of ventricular septal defect using PDA devices is gaining acceptance in selected cases as compare to surgical closure which is associated with morbidity and mortality. Potential advantages of the transcatheter closure over conventional surgery include a smaller incision, shorter stay and fewer complications.

METHODS 78 Cases under went echo and cardiac cath. Out of 78 patients 10 patients send to surgery because of improper size or location of the VSD. 68 cases were having defect size ranging from 3mm to 10mm. The location of VSD was perimembranous in 60 cases, muscular in 08 cases and apical in 01 case. The procedure was performed in 68 cases with PDA device.

PROCEDURE LV Angiography showed VSD. Lima Catheter was passed in LV with rotation and pull back technique, then crossed VSD and was placed in RV. Double length Terumo 0.035" x260 cm wire was taken and passed through RV, RA, IVC, SVC or PA. Snared through